



Technical Document 2897
February 1996

Natural Resources Management Plan for Naval Submarine Base, San Diego

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Marine Environmental Support Office
NCCOSC NRaD RDT&E Division

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Naval Command, Control and
Ocean Surveillance Center
RDT&E Division

San Diego, CA
92152-5001

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**NAVAL COMMAND, CONTROL AND
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RDT&E DIVISION
San Diego, California 92152-5001**

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ADMINISTRATIVE INFORMATION

The work detailed in this report was performed for Naval Submarine Base, San Diego, CA, by the Naval Command, Control and Ocean Surveillance Center RDT&E Division, Computer Sciences Corporation, and the San Diego State University Foundation.

Released by
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Executive Summary

Location and Status

- The Navy has stewardship responsibility for all natural resources within the boundaries of its facilities and actions; these resources include all those found within or upon air, land, and water. The Natural Resources Management Plan (NRMP) is intended to provide clear guidance and plans of action for managing, protecting, preserving, and enhancing all such natural resources. It is a living, working document that should be constantly updated as goals and objectives are accomplished and new goals are set.
- SUBASE is located on approximately 288 acres of land on the eastern shore of San Diego Bay, on the Point Loma. The developed areas are restricted to approximately 10 to 15 acres of the relatively flat area along the shoreline.
- The Natural Resource trustees at Naval Submarine Base are all on-board personnel, guided by the SUBASE Environmental Department.
- Approximately one third (96 acres) of the total land mass of SUBASE's 288 acres is considered environmentally sensitive; it consists of undeveloped hillsides and canyons along the western and southern boundaries. These native habitat areas have introduced landscape species, non-native grass, and weedy plant species. These non-native plant infestations must be removed.
- SUBASE hosts the oldest documented great blue heron and black-crowned night heron colonies in San Diego County, actively breeding in the Urban Wildlife Interface. Peregrine falcons nested for the first time in 49 years on the end of Point Loma in 1995. Least terns feed at the water front, as do brown pelicans; both species are endangered. The threatened California gnatcatcher has only been seen recently on Point Loma as a single dispersing young. Subase has numerous native mammals, including bobcat, coyote, and gray fox. The only sensitive insect species confirmed to appear on SUBASE property as of 1994 is the Wandering Skipper Butterfly (*Panoquina errans*). The endangered western mastiff bat feeds over Subase. Reptiles found on SUBASE include the Orange-throated Whiptail Lizard (*Cnemidophorus hyperythrus beldingi*) which is now a Federal candidate species and is described as threatened in San Diego County.

- The natural vegetation of SUBASE constitutes a diverse assemblage of approximately over 117 native and approximately 53 introduced plant species. Five basic natural plant communities include:
 - Southern maritime chaparral,
 - Maritime sage scrub,
 - Southern coastal bluff scrub,
 - California grassland, and
 - Southern foredune vegetation.

- The historical heritage of Point Loma dates from 1542 when the first Euro-American entered the bay. Under Spanish, Mexican and American periods of California history, the Point Loma lands were of prime importance in terms of civilian maritime activities and military defense strategies. California Historical Landmarks include:
 - San Diego Whaling Station,
 - Quarantine Station (Old La Playa),
 - Tip of Ballast Point,
 - Fort Rosecrans,
 - Fort Guijarros.

- Outdoor recreation on SUBASE consists of a baseball field, tennis courts, picnic areas and jogging-cardiovascular courses.

- All Subase Environmental and Facilities personnel will receive appropriate training in recognition, handling, and locations of natural resources on base. All Commanding Officers, Executive Officers, and those in the chain of command for Duty Officers and Security Officers will receive appropriate, basic training in recognition and importance of local natural resources as part of their assigned duties.

Management Recommendations:

- **Erosion Control:**
 - All project plans will be approved before implementation by the SUBASE Environmental Code.
 - Require projects to disperse water, not to concentrate it.
 - Use brow ditches as a very temporary measure.
 - Require "mechanical" forms of erosion control for every project until the permanent, natural erosion control of native vegetation is completely established.
 - Schedule projects to take advantage of normal rainfall.

- Be prepared to reseed or replant two to four times if a project is completed after the normal rain cycle.
- Minimize the area of cut slopes in project design and implementation.
- Specific actions are presented for immediate implementation

- **Esthetic Appearance:**

- SUBASE will set up a Composting Facility.
- Publish and enforce regulations via SUBASE Security against dumping trash and provide more and larger trash containers.
- Contact and schedule a qualified arborist to supervise the care of all landscaping trees on board SUBASE.
- Require all landscaping plans and new contracts to install drought tolerant native plants, which will be Point Loma specific species if the project is near or touches wildlands areas.
- Plan removal and replacement of water-hogging and inappropriate, riparian-system alder trees near BOQ.

- **Outdoor Recreation:**

- Environmental education, especially the hands-on type, is an exceptionally fine way to teach appreciation and understanding of the ecosystems upon which all living things (including humans) depend.
- Environmental education can be done by creating a Docents Program to involve families and people who live on SUBASE .
- Create a Living Memorial Native Tree or Shrub Program, in which SUBASE would offer a choice of appropriate native trees and shrubs to plant with small plaques to commemorate people, achievements, or events such as births, deaths, weddings, graduations, and retirements.
- Photograph display in major building lobbies and quarterdecks all over SUBASE would serve to highlight seasonal changes and colorful plants along with items of interest in Subase wildlands.

- **Fish and Wildlife:**

- Keep the Point Loma Wildlands Habitat Island as healthy as possible by expanding and enhancing suitable wildlife habitat.
- Prevent introduction and spread of introduced plants and weeds.
- Protection of the eel grass bed just south of Ballast Point will also protect prime fish habitat and nursery grounds.
- Monitor natural resources for baseline data and population trends

Section I: Introduction

Purpose of Plan

The Navy has stewardship responsibility for all natural resources within the boundaries of its facilities and actions; these resources include all those found within or upon air, land, and water. The Natural Resources Management Plan (NRMP) is intended to provide clear guidance and plans of action for managing, protecting, preserving, and enhancing all such natural resources. Except for intent and purpose, the NRMP is not rigid and unchanging. It is a living, working document that should be constantly updated as goals and objectives are accomplished and new goals are set. Updates on a regular schedule are critical for this document to remain useful and used by the Command's management. Neither natural landscapes and ecological systems, nor specific Navy missions, remain unchanged over time. This document must be flexible as changes occur and new scientific findings are discovered. The purpose of this plan is to provide information and guidance that will enhance the Natural Resources program of the Naval Submarine Base San Diego (SUBASE). Specifically, this plan will maintain and enhance all SUBASE Natural Resources to provide appropriate long-term living conditions for resident personnel and all other living organisms.

Authority

DODINST 4700.4 states the Department of the Navy shall act responsibly in the public interest of managing its lands and natural resources. SECNAVINST 6240.6E assigns responsibility to the Chief of Naval Operations and the Commandant of the Marine Corps for development and implementation of natural resources programs on all land and water areas under the jurisdiction of Department of the Navy. OPNAVINST 5090.1b requires that each naval installation having land or water areas suitable for the conservation and management of natural resources, or with

natural resource problems, prepare a multiple-use natural resources management plan to include all phases of natural resources management applicable to the installation, future requirements, and projects to be accomplished. The plan shall include management of land; forest; fish, wildlife, and endangered species; outdoor recreation; wetlands and flood plains; off-road vehicles; natural, cultural, and historic areas; and ecological reserve and research natural areas; when appropriate. It shall conform to the Environmental Protection and Natural Resources Manual, NAVFAC P-73, Volume II. These manuals contain the technical information by which the station can carry on an efficient and economical multiple-use natural resources management program.

Location

The Submarine Base is located on the Point Loma Peninsula in San Diego County, approximately 3.7 miles west southwest of the San Diego International Airport (Lindberg Field) and 6.8 miles from downtown San Diego. Access to the facility is provided by a guarded access point on Rosecrans Road, and through the Naval Command, Control and Ocean Surveillance Center (NCCOSC) facility on McClellan Road. Secondary access may be obtained via Ashburn Road (See Appendix A- Submarine Base, Point Loma Facility location map). SUBASE is bordered on the North by the Naval Supply Center (NSC), on the West by the NCCOSC-Seaside and the U.S. National Cemetery, on the South by Cabrillo National Monument and on the East by San Diego Bay. The U.S. Coast Guard Station and Naval Station San Diego Magnetic Silencing Facility share common access with SUBASE, and have facilities located within SUBASE lands. Appendix A, Maps 1 and 2, detail SUBASE's geographical location.

Mission

The mission of SUBASE is scientific and technical oceanic development of Navy resources. It is involved in the development and operation of deep submergence vehicles, research submarines, rescue submarines, the training of personnel for submarine warfare functions, and providing support to the U.S. Pacific Fleet Submarine Force.

SUBASE has been the home port for Submarine Squadron 3. SUBASE also provides Mark 48 torpedo maintenance, storage, and minor repair facilities in support of Commander Submarine Force, Pacific Fleet Representative.

One of the missions of the SUBASE is to provide torpedo maintenance, storage and handling support to the Submarine Force. These activities generate Explosive Safety Quantity Distance (ESQD) arcs which include most of the buildable land on the Facility. This constraint will adversely impact the existing undeveloped/wildlife land, if the Facility has to expand outside the ESQD area into the steeper lands. Historically, the ESQD has positively impacted wildlife and wildlife habitats by preserving a large area of mostly undisturbed wildlands from development.

Many of these mission areas are currently in a state of flux and some are being redesigned due to major military cutbacks.

History of Installation

The first occupants of Point Loma were the San Diegueno Indians, whose territory extended from north of San Diego Bay, south into Baja California and east to the mountains. On 28 September 1542, a Portuguese sailor, Juan Rodriguez Cabrillo, went ashore near the harbor entrance at Ballast Point. This is the first recorded European presence in the San Diego area. Almost one hundred and sixty years later, Sebastian Vizcaino, a Spanish trader who visited the bay in November 1662, named San Diego Bay in honor of the Franciscan lay brother, San Diego de Alcala.

The Spanish, fearing Russian advances in the area, sent two expeditions to establish a settlement in 1769. The settlement was established because the site afforded excellent protection at a narrow portion of the ideal anchorage of the harbor. This settlement was fortified by the Spanish in 1793. Fort Guijarros, located at Ballast Point, was the first military installation at Point Loma.

In 1810, the Mexican War of Independence began. Independence from Spain was declared on the 16 September 1810. In 1846, during the Mexican-American War, the United States Government took possession of Point Loma. The treaty of Guadalupe Hidalgo, proclaimed 4 July 1848, ceded all of California to the United

States, as a result of the Spanish American War. In 1852, two years after California became a state, President Millard Fillmore set aside the southern portion of Point Loma, about 1,400 acres, for military use.

From 1856 to 1869, the Point Loma area supported a thriving whaling industry. Whales were found off the Pacific Coast and in the Bay. The whaling industry and civilian use of Point Loma came to a halt in 1874, when the United States Army took control. Several seacoast batteries, along with Fort Rosecrans, were constructed in 1889-99.

Now a national monument, the "Old Spanish Lighthouse" was constructed in 1855, in the New England style, out of the old adobe bricks from Fort Guijarros. This lighthouse functioned for nearly 40 years. Because of its height, much of the time its light shown into or over the fog. In 1891, the present lighthouse was constructed at the south tip of Point Loma. This lighthouse is still active and operated by the U.S. Coast Guard.

World War II, and especially the Pacific Theater of Operations, saw a dramatic expansion of the facilities at Point Loma. Today, Point Loma and the San Diego Bay area are home to over twenty Naval and Marine Corps installations. The Department of the Army, in 1957, declared the Old Fort Rosecrans area excess property and transferred it to the Department of the Navy. The Navy established the Naval Submarine Support Facility, and began construction in 1961. In November of 1974, the Submarine Support Facility became a shore command. By 1977, three piers (5001, 5002, 5003) and support buildings had been constructed. In 1981 the Facility was upgraded to Submarine Base, San Diego, becoming one of two such facilities on the west coast.

Present land use

SUBASE is located on approximately 288 acres of land on the eastern shore of San Diego Bay, on the Point Loma Naval Facility (See Appendix A- Submarine Base, Point Loma Facility location map.) The existing land uses are divided into: Administration, Housing, Training, Operations, Storage, Support, Urban Wildlife Interface, and Undeveloped/Wildlife area. Much of the land is steep terrain composed of highly erodible soils. The developed

areas are restricted to approximately 10 to 15 acres of the relatively flat area along the shoreline.

In 1988, the SUBASE reached an agreement with the NSC to annex lands between their existing north boundary and McClellan Road. Beginning in 1991, SUBASE initiated the process of creating the Point Loma Ecological Reserve Area in exchange for permission to construct a larger childcare building on the land annexed from NSC. This Reserve was completely established in 1995 with the formal signing of a Memorandum of Understanding (MOU) between U.S. Fish and Wildlife Service and all commands on Point Loma.

Natural Resource Trustees

The Natural Resource trustees at Naval Submarine Base are on-board personnel, guided by the SUBASE Environmental Department, specifically the Natural Resource Manager, and the Commanding Officer. The Natural Resources Manager is responsible for the stewardship and maintenance of all natural resources at the base, and is expected to provide proactive guidance to the Commanding Officer, SUBASE Facilities, and all other SUBASE personnel. Other Natural Resource Trustees are U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), University of California Los Angeles (UCLA), Riverside Museum holding baseline collection of SUBASE insects, Point Loma Reserve Guiding Committee, San Diego Natural History Museum, Project Wildlife and the Peregrine Fund, NCCOSC Marine Environmental Support Office (MESO), and concerned private citizens.

Section II: Natural Resources

Description and Inventory

Introduction

This section presents the biological objectives for identifying critical biological resource areas that will form the basis of this NRMP. It also outlines the ecological principles upon which the criteria are based. The overall goal of the NRMP is to develop a management plan that ensures the long-term protection and perpetuation of viable biological communities in the Point Loma SUBASE. To achieve this objective, identification of viable communities, with an emphasis on areas of high biological diversity, is necessary.

Biological diversity is defined as the variety of life forms, the ecological roles that they perform, and the genetic variation they contain (Wilcox 1984). The maintenance of biological diversity has become an increasing concern as development and other land uses encroach upon and fragment native habitats. Those species that are most sensitive to such changes in their environment as loss of habitat, isolation, and the introduction of non-native plant competitors and predators, will be extirpated (i.e. exterminated or eradicated) locally and may become extinct. An important aspect of managing biological diversity is to focus on the management of ecosystems and a variety of native habitats and species, rather than focusing on single species or populations (Noss 1983). The goal of this management approach is to maintain ecosystems. The NSC contains several species of flora and fauna species considered threatened and endangered by the USFWS and the CDFG.

Soils

A "Soil Survey of San Diego Area" was published by the Soil Conservation Service, in 1973, which covers the Point Loma Naval Complex. The soils are on alluvial fans, old beach ridges

and hillside slopes. They formed on materials weathered from alluvium or sandstone. Three soil series are recognized; Carlsbad, Gaviota, and reiff soils. Miscellaneous land types are Coastal Beaches and steep gullied land.

Soil scientists surveyed the Point Loma area to learn what kinds of soil are in the area, where they are located and how they can be used. They observed the steepness, length and shape of slopes; the kinds of native plants or crops; the kinds of rocks and many facts about the soils. Holes were dug to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

These profiles were compared with those in nearby areas and in places more distant. The soils were classified and named, according to nationwide, uniform procedures. The soil series and the soil phase are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in the thickness, arrangement and other important characteristics. Each soil series is named for a town or other geographic features near the place where a soil of that series was first observed and mapped. Escondido and Fallbrook, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that effect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness or some other characteristic that affects use of the soils by humans. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Escondido very fine sandy loam, 9 to 15 percent slopes, eroded, is one of several phases within the Escondido series.

After a guide for classifying and naming the soils had been worked out, the soil scientists identify the boundaries of the individual soils on aerial photographs.

The areas shown on a soil map are called mapping units. On most maps, detailed enough to be used in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small scattered isolated bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

General Soils Description

The soils of this Naval base are on alluvial fans, old beach ridges and hillside slopes. They formed on materials weathered from alluvium or sandstone. Three soil series are recognized; Carlsbad, Gaviota and Reiff soils. Miscellaneous land types are Coastal Beaches and Steep Gullied Land. A description of map units and their properties follows:

- CbB** Carlsbad gravelly loamy sand, 2 to 5 percent slopes. The soils of this map unit are gently sloping and is 36 to 39 inches deep over a hardpan. In other features, this soil is similar to Carlsbad gravelly loamy sand, 5 to 9 percent slopes.
- CbC** Carlsbad gravelly loamy sand, 5 to 9 percent slopes. The soils of this map unit are on old beach ridges and are moderately well-drained. Elevation is 250 to 350 feet. In a typical profile, the surface layer is brown gravelly loamy pale brown loamy sand, underlain, at a depth of 39 inches, by a weakly cemented hardpan over sandstone.
- CbD** Carlsbad gravelly loamy sand, 9 to 15 percent slopes. The soils of this map unit are strongly sloping are 26 to 39 inches deep over a hardpan. In other features, this soil is similar to Carlsbad gravelly loamy sand, 5 to 9 percent slopes.
- Cr** Coastal Beaches are narrow, sandy or gravelly stretches of land along the sea coast. The sand on the beaches has been washed and rewashed by the constant sea wave action. During high tide periods the beaches are likely to be covered with water.

- GaE** Gaviota fine sandy loam, 15 to 30 percent slopes. Gaviota soils are on moderately steep hillsides and are well-drained. Elevation ranged from 200 to 375 feet. Typically, the surface layer is brown and yellowish-brown underlain, at a depth of 10 inches, by unweathered sandstone.
- GaF** Gaviota find sandy loam, 30 to 50 percent slopes. This map unit is essentially the same in color and sequence of horizons as GaE, except this map unit is at elevations of 125 to 375 feet and is on steep hillsides.
- HaG** Hambright gravelly clay loam, 30 to 75 percent slopes. This map unit consists of well-drained, shallow gravelly clay loams that formed in material derived from shaly breccia. The elevations range from 200 to 1,800 feet. Typically, the surface layer is brown, slightly acid gravelly clay loam, about 8 inches thick. The subsoil is brown, slightly acid gravelly clay loam, about 9 inches thick. At a depth of about 17 inches is greenish and bluish shaly breccia.
- RkA** Reiff fine sandy loam, 0 to 2 percent slopes. Reiff soils are on alluvial fans and ocean terraces and are well-drained. Elevation ranges from sea level to 150 feet. Typically, the surface layer is grayish-brown and brown fine sandy loam, about 27 inches thick. The underlying soil material, to a depth of 60 inches or more, consists of layers of brown fine sandy loam through loam. This unit has steep shoreline cliffs bordering the ocean.
- StG** Steep Gullied Land. This map unit consists of moderately-steep or steep areas where geological erosion is actively eroding the soil. Erosion has left a network of v-shaped channels in areas where the vegetative cover is sparse or has been depleted by fires. Some areas have exposed bedrock and erosion is encroaching into the adjacent land.

These soils are used mostly for urban and military support purposes. The main limitations for urban use are steep slopes, shallow bedrock, cemented pan and cutbanks. Corrosivity is moderate for untreated steel pipe and is low or moderate for concrete. No land is available to develop agriculture on this base based upon soil classification.

Landform

The Naval Supply Center-Point Loma Annex (NSC-PLA) is located on Point Loma, a peninsula of about 600 acres extending approximately four miles into the Pacific Ocean. NSC-PLA is located on the northeast section of the Point Loma Naval Reserve, between NCCOSC-Topside, NCCOSC-Bayside, Naval Submarine Base and the City of San Diego to the north. The facility occupies approximately 288 acres of land. The topography slopes range from flat, 0 to 10 percent slopes, to steep uneven terrain, where slopes range from 30-75 percent.

The geologic stratigraphy of the Complex consists primarily of uplifted marine sedimentary strata of upper Cretaceous age (approximately 100 million years old). This strata, as influenced by climate and history, provides the basic parent material for the development of soils.

The Point Loma Formation, underlying the Complex, consists of marine mudstone, siltstone and fine sandstone deposits. Hambright soils are derived from this formation. Overlying this is the Cabrillo Formation, approximately the same age as the Point Loma, composed primarily of sandstone and sandstone-conglomerate sediments which produce the Gaviota sandy loams.

At elevations of 300 feet or more, the peninsula is capped by a Pleistocene Age Linda Vista Formation. This formation is a beach dune deposited approximately 100,000 years ago and is now represented as highly weathered sandstone. The soils formed from this formation are classified as Marina loamy course sands.

Climate

SUBASE is located in the coastal plain zone, which is characterized by a subtropical climate with average temperatures ranging from 46 to 68 degrees Fahrenheit. There is moderate humidity of 70 percent and an annual rainfall of 10 inches. The weather is distinguished by warm sunny days and moderate nights. There is generally warm summers and mild winters. Prevailing winds blow from the Northwest which are tempered by

the Pacific Ocean. The exception to this is the seasonal Santa Anas that bring hot winter winds from the east.

Sensitive and Endangered Species Definitions

Federal Program

Section 7 of the Endangered Species Act of 1973 as amended (ESA) imposes certain requirements upon Federal agencies. It applies to all plants and animals listed as endangered and threatened under the Act. In general, it requires Federal agencies to ensure that their activities or programs are not likely to jeopardize the continued existence of a listed species or its critical habitat. It also directs Federal agencies to confer with U.S. FWS with respect to the impacts of any activity or program on species proposed to be listed as endangered or threatened or the proposed critical habitat of such species. The Federal Endangered Species Program is presently directed by the Endangered Species Act of 1973 as amended. In this Act, "endangered" and "threatened" species are defined:

Endangered Species

Endangered Species (FE) means any species which is in danger of extinction throughout all or a significant portion of its range other than a species of class of insects determined by the Secretary of Interior to constitute a pest whose protection under the provision of this Act would present an overwhelming and overriding risk to humans.

Threatened Species

Threatened Species (FT) means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Federal Candidate Species

Federal Candidate Species are any species considered for listing as a threatened or endangered species, but which are not yet the subject of a proposed rule. Candidate species do not have any protection under the ESA. There are two categories of candidate species:

Category One Candidate

Category One (FC1) candidate for listing for which the U.S. Fish and Wildlife service (USFWS) have sufficient biological information to support a proposed listing as endangered or threatened.

Category Two Candidate

Category Two Candidate (FC2) candidate for listing for which existing information may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

Federal Proposed Species

Federal Proposed Species (FP) any species for which a proposed regulation has been published in the Federal Register. The proposed species are listed under section 4 of the ESA and are granted limited protection under the Act.

California Program

The California State Legislature has expressed its intent to preserve, protect and enhance endangered or rare plants and animals as issued in the Fish and Game Code (Division 2, Chapter 10 -- Native Plant Protection and Division 3, Chapter 1.5-- Endangered Species). Although this State law does not directly apply to Federal actions, it does apply to State agencies and private landowners. In the spirit of this law, and as an obligatory service to State agencies and private landowners, Federal agencies will operate under these guidelines. The State definitions are as follows:

Endangered Species

Endangered Species (CE) means any species, subspecies or plant variety whose prospects of survival and reproduction are in immediate jeopardy from one or more causes.

State Candidate

State Candidate (SC) a species officially noticed by the California Fish and Game Commission as being under review by DFG for inclusion in either the threatened or endangered species lists. Candidate species are protected if DFG gives notices to all interested parties through correspondence and newspaper announcements.

Species of Special Concern

Species of Special Concern (SSC) are species not included in any listing, but which are considered rare, threatened, or endangered if it is demonstrated that the species is diminishing in a significant portion of its range.

California Rare Species

California Rare Species (CR) or Sensitive species (CS) means any species, subspecies, or plant variety that, although not presently threatened with extinction, is in such small numbers throughout its range that it may become endangered if its present environment worsens. This listing is sometimes used to address regional concerns from State and community groups.

Status Definitions:

FE - Federally listed as endangered.

FT - Federally listed as threatened.

FC1 - Federal Category 1 Candidate for listing as threatened or endangered by federal government.

FC2 - Information on hand is inadequate for immediate listing, but available information indicates listing may be appropriate when further information becomes available.

FC3C - Candidate for listing as threatened or endangered by federal government, but information on hand indicates this species is more widespread than previously thought or it is not believed currently threatened.

CE - California endangered, listed as endangered by the California Department of Fish and Game.

CT - California Threatened, listed as threatened by the California Department of Fish and Game.

CP - California Protected, a fully protected species in the state of California.

SSC - California Department of Fish and Game Species of Special Concern, species that appear to be declining in California.

Biological Resources

SUBASE is rich with natural resources. Approximately one third of the total land mass of SUBASE's 288 acres is considered environmentally sensitive. This area consists of undeveloped hillsides and canyons along the western and southern boundaries. The natural Chaparral and Maritime Sage Scrub habitat, which occurs in these areas, provide a buffer zone between the public areas of the National Cemetery and the sensitive activities of the SUBASE Operations area. In addition, healthy stands of eelgrass are established in the near shore waters south of Ballast Point.

Much of the native habitat within the developed areas, has been either destroyed or altered because of the military activity on the facility. This has limited the areas where the native habitat occurs and has provided sources for introduced landscape species, non-native grass, and weedy plant species. Some of these species include: acacia, eucalyptus, jubata grass, castor bean, ice plant, Australian salt bush, and chrysanthemum (Appendix D). These infestations must be removed (Appendix E).

Fish and Wildlife

Birds

SUBASE hosts the oldest documented great blue heron and black-crowned night heron colonies in San Diego County, actively breeding in the urban wildlife interface. Birds from these colonies probably started the other colonies now breeding within the city of San Diego. Brandt's cormorant primarily breed on San Nicholas Island, one of the Channel Islands. A small colony has bred occasionally on the west side of Point Loma, just north of the San Diego City Sewage Treatment Plant. A single nest occurred in 1994 on the MSF pier. An individual cormorant has been seen standing near nesting material laid on a pier footing in November

1995. Successful nesting of at least ten pairs is anticipated for 1996. Western gulls nest on the building roofs, sometimes on ball fields and on Port Services equipment. Other native bird species known to nest recently in or near SUBASE operational areas are: killdeer, mallard, and common raven. Peregrine falcons nested for the first time in 49 years on the end of Point Loma in 1995, and fledged three young males. Other bird species of note are ospreys, which have stayed around the waterfront all year in 1995; a dispersing juvenile burrowing owl, probably from breeding colonies at Naval Air Station North Island, took up residence at the end of Ballast Point for about three months in 1993. Least terns feed at the water front, as do brown pelicans. Brown pelicans, western gulls, Heerman's gulls, great blue herons, great egrets, snowy egrets, double-crested cormorants, Brandt's cormorants, royal terns, Caspian terns, Forrester's terns, and least terns all feed and rest at the waterfront and on MSF piers.

The California gnatcatcher has only been seen recently on Point Loma as a single dispersing young (Appendix D - Gnatcatcher Survey). However, the wildlands still have California thrashers, California scrub jays, mockingbirds, California towhees, rufous-sided towhees, wrentits, bushtits, great-horned owls, barn owls, western screech owls, all of which breed on base. For a complete list of bird Species at SUBASE, and their current level of protection, see Appendix B.

Mammals

In 1980-81 a small mammal trapping program was conducted by Woodward Clyde at three locations on SUBASE property (near McClellan Road). Dominant species found in chaparral habitat include: desert wood-rat (*Neotoma lepida*), cactus mouse (*Peromyscus eremicus*), and the San Diego pocket mouse (*Perognathus fallax*). These same species were also predominantly found in maritime sage scrub habitat on SUBASE. Other native mammals that occur on Point Loma areas include: bobcat (*Felix rufus*), gray fox (*Urocyon cinereoargenteus californicus*), California ground squirrel (*Spermophilus beecheyi*), striped skunk (*Mephitis mephitis holzneri*), desert cottontail (*Sylvilagus audubonii*), desert woodrat (*Neotoma lepida*), dusky-footed woodrat (*Neotoma fuscipes macrotis*), three genera of shrews, and Western spotted skunk (*Spilogale gracilis microrhina*). Expected native animals include: Southern pocket gopher (*Thomomys bottae*), agile kangaroo rat (*Dipodomys agilis*), Western harvest mouse (*Reithrodontomys megalotis longicaudus*), California mouse

(*Peromyscus eremicus*), deer mouse (*Peromyscus maniculatus*), brush mouse (*Peromyscus boylii rowleyi*), and California mole (*Microtus californicus sanctidiegi*). Introduced mammals include: European house mouse (*Mus musculus*), brown rat (*Rattus rattus*), wharf rat (*Rattus norvegicus*), red fox (*Vulpes fulva*), feral cats (*Felix domesticus*), and opossum (*Didelphis virginiana*).

Insects

October 1993 through September 1994, a sensitive insect survey (as well as an intensive survey for other insect species) was performed on Point Loma Navy property by Bruyera Biological Consulting (BBC) and Barnes Enterprises personnel. These projects consisted of a thorough survey for sensitive and other insects currently inhabiting Navy property on Point Loma. A survey of literature and museum records representing the historical presence of insects on Point Loma was also conducted.

The primary goal of field work conducted by BBC was to determine the presence, distribution and ecology of any sensitive insect species found on Navy property on Point Loma. Greater field time was expended surveying areas believed to contain potential habitat for sensitive insects due to the presence of known host plants or other habitat characteristics. Six sensitive insect species were selected as possibly occurring on Navy property on Point Loma due to the previously documented occurrence of potential habitat, or because known sites are located in the vicinity of Point Loma. These are the Federal C1 Candidate Quino Checkerspot Butterfly (*Euphydryas editha quino*), four Federal C2 Candidates as follows: Sandy Beach Tiger Beetle (*Cicindela hirticollis grandid*), Sand Dune Tiger Beetle (*Cicindela latesignata*), Hermes Copper Butterfly (*Lycaena hermes*), Wandering Skipper Butterfly (*Panoquina errans*), and the Margined Scarab Beetle (*Dinacoma marginata*) which is believed worthy of protection by several entomologists and is under consideration for Federal status by the US Fish and Wildlife Services (M. Nelson, USFWS, pers. comm).

The results of the survey are included in Appendix F. The only sensitive species confirmed to appear on SUBASE property as of 1994 is the Wandering Skipper Butterfly (*Panoquina errans*).

Bats

SUBASE joined a larger Naval Engineering Facilities Southwest Division (SWDIV) contract to survey for bat presence or absence on southern California Naval Command properties in 1994. These surveys were done by Brown Berry Biological Consulting, headed by Dr. Patricia Brown-Berry. The endangered Western mastiff bat (*Eumops perotis*) consistently fed over Fort Rosecrans National Cemetery and portions of SUBASE from about 21:00 to 23:00. One medium sized bat, possibly *Eptesicus*, and one Mexican free-tailed bat (*Tadarida brasiliensis*) were seen during year-long surveys. All bunkers and other potential roosts were examined; no evidence of bat presence was found. A consistent, loud buzzing sound was always heard on survey. It was in the middle of most bat hearing ranges and is probably an artifact of standard navy operations. The current hypothesis is that this noise is "blinding" most bats and preventing them from inhabiting or foraging over the Naval Complex on Point Loma. Bats are found at the base of Point Loma and in other portions of San Diego.

Reptiles

The San Diego Horned Lizard (*Phrynosoma coronatum blainvillei*), is under consideration for listing by the USFWS. This species has historically occurred on Point Loma, although recent surveys have been unsuccessful. Due to loss of habitat by urban and agricultural development as well as collection pressures and disruption of habitat by off-road vehicle activity, The San Diego Horned Lizard is considered endangered in San Diego County. (San Diego Herpetological Society, 1980). Open, sandy, undisturbed areas on the upper slopes of SUBASE may provide suitable habitat for this sensitive species. Due to the cryptic nature of the lizard, its presence on Point Loma cannot be ruled out; however, a relatively small population would be expected.

The Orange-throated Whiptail Lizard (*Cnemidophorus hyperythrus beldingi*) is now a Federal candidate species and is described as threatened in San Diego County (San Diego Herpetological Society, 1980). It has been sighted at several locations on the Point Loma peninsula, including chaparral vegetation on SUBASE (Woodward-Clyde, 1981). The highest concentrations were reported along the eastern side of Cabrillo National monument. For a list of other known SUBASE reptile residents, see Appendix B.

Vegetation

Point Loma has a Mediterranean climate with cool wet winters and dry warm summers. It receives a total annual average rainfall of approximately 9.5 inches (National Oceanic and Atmospheric Administration, Lindberg Field). Vegetation in the study area consists predominantly of drought-tolerant brushland types, which are well adapted to the semiarid maritime climate that is typical of coastal southern California. The natural vegetation of Point Loma constitutes a diverse assemblage of approximately over 117 native and approximately 53 introduced plant species. Five basic natural plant communities, totaling approximately 600 acres, were identified and mapped on federal property, including: Southern maritime chaparral, Maritime sage scrub, Southern coastal bluff scrub, California grassland, and Southern foredune vegetation. In addition to the terrestrial communities, eelgrass beds are present in the nearshore environment along the edge of San Diego Bay. Appendix B contains a complete list of plants that are known to exist on SUBASE and their regulatory status.

Cultural Resources

Cultural Resources Public Law 88-29, National Historic Preservation Act of 1966, provides an expansion of the National Register of Historic Places. This Act requires that Federal agencies, with direct or indirect jurisdiction over a federal, federally assisted, or federally licensed undertaking, identify properties eligible for or listed in the National Register. Executive Order 11593 requires Federal agencies to identify properties on or eligible for the National Register within their land holdings. It also requires Federal agencies to establish procedures for protection of cultural resources.

The historical heritage of Point Loma dates from 1542 when the first Euro-American entered the bay. Under Spanish, Mexican and American periods of California history, the Point Loma lands were of prime importance in terms of civilian maritime activities and military defense strategies.

Prehistoric Period

The Point Loma area was first archaeologically surveyed in the 1930's by Malcolm Rogers. Approximately 12 sites, eight off-shore and four on-shore, have been recorded prior to the Flowers and Roth survey in 1982. Carbon dating of shell fragments from known midden sites shows that Point Loma was occupied, by early man, 7,130 (plus or minus 350) years ago. Other dating pushes early occupation, in San Diego County, back 85-9000 years Before Present (BP).

The prehistoric periods fall into several areas; San Dieguito I/Paleo-Indians, San Dieguito II and III, Millin Stone Horizon, La Jolla Complex, and the Late Prehistoric Horizon. It is this culture that inhabited the San Diego area at the time of the first western contact.

Archeological Sites

Exact locations of known archaeological sites are considered sensitive information and are marked only on secure maps, held by the Cultural Resources Manager, for site protection. Generalized areas of known archaeological sensitivity can be supplied by the Cultural Resources Manager, who will be consulted during both planning and implementation stages of all projects to prevent degradation of archaeological resources.

Historical Period

Five historic sites within the Point Loma Naval Complex have been declared California Historical Landmarks by the State Historical Resources Commission. The criteria used for designating a site as historical are: must be of state-wide significance; have anthropological, cultural, military, political, architectural, economic, scientific, technical, religious, experimental or other values.

The five historic sites are: (1) the San Diego Whaling Station, (2) the Quarantine Station (Old La Playa), (3) the Tip of Ballast Point, (4) Fort Rosecrans, (5) Fort Guijarros.

Thirty-four separate historic properties have been recorded since the 1982 survey conducted by the Flowers and Roth (see Appendix I, References).

Other

Outdoor Recreation

Outdoor recreation on SUBASE consists of a baseball field off Steam Plant Road and one near the piers, several tennis courts, picnic areas and jogging-cardiovascular courses. Most of these facilities are in good to excellent condition.

Fishing and Hunting

Hunting is not permitted anywhere on SUBASE property (or anywhere on the Point Loma Naval Complex) due to security restrictions, City of San Diego ordinances, safety concerns, and lack of appropriate resources. Fishing activity is permitted only for SUBASE personnel stationed on the base and is restricted to the pier areas (in San Diego Bay waters). No fish and wildlife stocking or control programs exist for SUBASE at this time.

Section III: Natural Resource Management Recommendations

Training

All Subase Environmental and Facilities personnel will receive appropriate training in recognition, handling, and locations of natural resources on base. All Commanding Officers, Executive Officers, and those in the chain of command for Duty Officers and Security Officers will receive appropriate, basic training in recognition and importance of local natural resources as part of their assigned duties. Additional specialized training as appropriate will be made available to Environmental, Facilities, and Command personnel.

Land Management

Goal: Erosion Control

Uncontrolled erosion in wild and urban areas of SUBASE is the major cause of local sediment pollution loading of San Diego Bay, clogged storm drains, lack of success in revegetation, and extensive gullies.

Methods: Erosion Control

All project plans will be approved before implementation by the SUBASE Environmental Code. Proper prior planning will prevent costly change-orders, project down-time, and post-project fixes that may cost more than the original project.

Require projects to disperse water, not to concentrate it. Inspect resources and areas outside the boundaries as well as down-slope aspects of the proposed project. Review the project in the context of its setting; concentrating water from this project and dumping it into existing native vegetation can cause new erosion and new

problems. Consider all seasonal sources of water above the project area. Remember, this project is not being built in a vacuum; in a wet year, a previously unidentified seasonally-active stream could wash out the slope, and the entire project.

Use brow ditches as a temporary measure. SUBASE soils are sandy, steep, and highly erodible. They also move frequently, all of which has provided many past and current examples of cracked and washed-out cement brow ditches on SUBASE. Also brow ditches are intended to be placed at the top of the denuded or cut slope to prevent excess sheet flow down the vulnerable slope. They are not to be installed at the top of retaining walls, leaving the naked slope wide open to erosion.

Require "mechanical" forms of erosion control for every project until the permanent, natural erosion control of native vegetation is completely established. Erosion control techniques such as shallow benching and biotechnical measures (wattling, brush matting, or brush layering), or mats made of coconut fiber, jute fiber, or wood curls can all be effective in slowing and dissipating water on new and old projects.

Schedule projects to take advantage of normal rainfall; be prepared to reseed or replant two to four times if a project is completed after the normal rain cycle. Plan additional reseeding or container plant costs into project budgets. Expect to reseed two to three times more on a cut slope than on a flatter area, and plan additional seeding costs into the project budget.

Cut slopes are difficult and challenging to revegetate; minimize the area of cut slopes in project design and implementation. Support and promote research on better, more effective techniques for restoring all wildlands, and specifically cut slopes. Some research topics to pursue include: creation of endemic-plant seed sources for harvest and placement in a seed bank, use of recalcitrant soil amendments, local mycorrhizal fungi, replenishment of soil biota, cryptogametic soil crusting, ways to reduce and eliminate introduced plant species, and methods of promoting and enhancing restoration of healthy, native vegetation.

Immediate Action: Erosion Control

Install wider stairs (three or four persons abreast) in more locations at the Upper Ball Field, including at least one on the east side. Stair locations are easily located by observing the bare, eroded areas where people have carved paths straight down slopes from the ball field to parking areas. The eroded area-paths on both sides of the existing stairs on the west side demonstrate the need for wider stairs.

Stock Point Loma specific native-plant species seeds, cuttings, or other propagules for both emergency planting in disturbed land situations and planned project use. The US Forest Service's Moran Research Station between Sacramento and Davis CA has the facilities and can supply the service of long-term storage of native seed, with accurate tests and data on seed viability. S & S Seeds could probably also provide such a service, but seed containers may not be easily retrievable, and they do not have the extensive laboratory of seed-viability assessment technology. Quality native plant nurseries such as The Tree of Life Native Plant Nursery can also collect, stock, and propagate cuttings and some seed.

Goal: Esthetic Appearance

A major goal of land management is to maintain and improve the esthetic appearance of SUBASE.

Methods: Esthetic Appearance

Designate an area or areas for stockpiling or disposing of unwanted clean dirt. This location should be other than in back of the Old Colony Heronery where dirt piles are a cause of runoff pollution. A lot of water washes over the top and sides of the constructed plateau west of the nesting trees in wet years, and runs through the grove and down the cut slope east of Rosecrans Street. Any dirt piles placed in back of the nesting trees are usually in the water's path and get washed into the brow ditches on the cut slope. The sediment then goes through the storm drains to quickly run into San Diego Bay.

Immediate Action: Esthetic Appearance

SUBASE will set up a Composting Facility. The maintenance and upkeep of SUBASE grounds generate a large amount of organic

waste. This waste includes grass clippings, weeds, tree trimming branches, and leaf litter. This facility can treat waste organic material biologically by producing a humus-like material that can be recycled as a soil amendment and fertilizer substitute. Proper management of organic waste can reduce the level of nutrients in runoff and decrease overall runoff volumes through the addition of humus to the soil. Increased levels of humus enhances soil permeability, decreases erodibility, and provides nutrients in a less soluble form than commercial fertilizers. Humus will be useful in regular grounds keeping, as well as revegetation and restoration projects. Open composting areas to SUBASE personnel home generated wet or green garbage as well as Subase generated wet and green garbage. Require coffee grounds and filters from SUBASE messes, including all ships in port, be composted.

Publish and enforce regulations via SUBASE Security against dumping trash and provide more and larger trash containers. Fast food refuse and old auto parts are frequently found in wildlands near parking areas. Personnel will be specifically required to use the Auto Hobby Shop instead of the parking lots for oil changes and vehicle repair.

Contact and schedule a qualified arborist to supervise the care of all landscaping trees on board SUBASE. All tree pruning will be designed and supervised by an arborist, and done on an arborist approved schedule. Tree pruning plans and sites will be inspected and approved in advance by the SUBASE Environmental Code, and must occur outside of the breeding season for sensitive birds. Due to a lack of proper tree maintenance in the past, both *Eucalyptus* species and *Ficus* species have unexpectedly shed large limbs, damaging both themselves and vehicles below them.

Require all landscaping plans and new contracts to install drought tolerant native plants, which will be Point Loma specific species if the project is near or touches wildlands areas. Such landscaping will reduce maintenance costs, provide additional wildlife habitat, and improve SUBASE's general appearance by blending landscaping into nearby wildlands. San Diego water is expensive now, and will only cost more in the future. Planting new landscapes, and retrofitting, when possible, old landscapes with drought tolerant native plants will also serve as a forum for educating new personnel about the beauty and utility of southern

California native plants. These plants are distinctively different from mid-western or eastern vegetation.

Immediate Action: Base Esthetics

Publish antitrash notices with fine schedules.

Meet with concerned personnel and designate areas for dirt, mulch, and compost pile placement.

Plan removal and replacement of water-hogging and inappropriate, riparian-system alder trees near BOQ.

Outdoor Recreation

Goal: Environmental Education

Environmental education, especially the hands-on type, is an exceptionally fine way to teach appreciation and understanding of the ecosystems upon which all living things (including humans) depend. Such education also helps build understanding of the reasons behind anti-pollution and recycling laws and regulations. Attitudes are changed and lasting compliance is more easily accomplished when true understanding and appreciation of the reasons behind the regulations exists.

Methods: Environmental Education

Environmental education can be done by creating a Docents Program to involve families and people who live on SUBASE in actively learning about and caring for, Navy natural resources. It could be patterned from the San Diego Natural History Museum's Docent Program, or the Mission Trails Park Foundation. Another hands-on program would be to develop an Adopt a Native Plant Area, so that people could feel that they "own" a space by actively participating in planning, designing, planting, and weeding. Personnel can be exposed to the concept that landscaping beauty does not have to be all straight lines and sharp corners, but can be more natural with rounded, flowing lines, and mosaic areas that create good habitat for native animals. A natural extension of these ideas is to create a Living Memorial Native Tree or Shrub Program, in which SUBASE would offer a choice of appropriate native trees and shrubs to plant with small plaques to

commemorate people, achievements, or events such as births, deaths, weddings, graduations, and retirements.

Immediate Action: Environmental Education

Items that can be quickly accomplished are to investigate museum and wildlife-preserve docent programs for techniques, guidelines, and options. While guidelines are being collected, inquiries can be made among SUBASE personnel for interested participants. Discuss and designate appropriate areas, plants, and funds for the Living Memorial. Assign personnel, perhaps from Morale, perhaps a combination including representatives from various ships, Environmental, and Facilities to work with the Living Memorial, and provide information on what it is and how to access it for SUBASE personnel. I suggest that oversight of the Living Memorial be one of the Command Master Chiefs responsibilities. Also a rotating photograph display in major building lobbies and quarterdecks all over SUBASE would serve to highlight seasonal changes and colorful plants along with items of interest in Subase wildlands. Such a display could serve as an attractive focal point for interesting facts about the value to humans of native wildlands and animals.

Wildland Use

Goal: Wildland Use

Wildland areas must be used to preserve native plants and animals. Passive recreation in small doses, photography for example, by humans in small doses will be the best form of wildland usage. Too many people at any one time can trample plants and damage the habitat. Identification and photography walks as well as scheduled slide shows can provide recreation and entertainment, as well as environmental-education opportunities.

Methods: Wildland Use

Arrange Nature Walks throughout the Docents Program or Environmental several times a year.

Immediate Action: Wildland Use

Create and place interesting and informative signs at the edge of the wildland interface discussing points of interest, such as a

heron colony, sensitive plants species, interesting viewpoints, historical points, or geological features. Actively maintain and improve existing recreational facilities. If interest exists, arrange a nature photography course.

Fish and Wildlife Management

Goals: Fish and Wildlife

Keep the Point Loma Wildlands Habitat Island as healthy as possible by expanding and enhancing suitable wildlife habitat. Biogeographic studies of habitat islands show clearly that the smaller they are, the more species are inevitably lost over time. Prevent introduction and spread of introduced plants and weeds. Require Point Loma specific native plants around both old and new projects to preserve and improve the wildlands interface with developed areas to improve and protect wildlife habitat. Requiring all projects to use a pre-approved form of mechanical erosion control will prevent sediment run off into San Diego Bay, with the accompanying destruction of fish habitat.

Methods: Fish and Wildlife

Protection of the eel grass bed just south of Ballast Point will also protect prime fish habitat and nursery grounds. Use ecological habitat restoration and Point Loma specific native plants to restore or enhance wildlife habitat by replacing more than just the obvious shrub layer. Wildlife habitat also contains perennial and annual forbes (broad leaved, non-woody plants), bulb plants, cacti, mosses, lichens, and native fungi and other soil organisms as well as large shrubs. Maintaining an available supply of Point Loma specific native plant propagules (seeds, cuttings, buds etc) and in storage is an extremely important tool for erosion control and habitat restoration. Wildlands can be protected by more and better buffer zones between them and human-occupied areas. Edge effect and urban sprawl can be reduced by concentrating facilities in already heavily disturbed areas and not extending them into wildlands. Using only existing roads and closing unnecessary roads also reduces edge effect.

Immediate Action: Fish and Wildlife

Review all projects before, during, and after installation for compliance with introduced plant removal from the project site

and compliance with erosion control measures. Require all projects to replant with native species, excepting only those in the midst of the urban, developed areas. Require xeric, drought tolerant landscaping (xeriscaping) in human-occupied areas if native species are not appropriate. Review all restoration and revegetation aspects of all projects well before installation. Arrange for the collection, storage, and propagation of living native plant and soil organisms, and knowledgeable monitoring of projects involving native plants or soils.

Goal: Fire Effects

Fire in California chaparral aids in recycling woody plant biomass and stimulates the germination of some seeds. It is a vital part of this community. Following a fire, the chaparral shrubs sprout vigorously with the first rains and may gain maximum size in 15 to 20 years.

Methods: Fire Effects

Fires on the Point Loma peninsula are extinguished immediately due to sensitive areas that include munitions, military buildings and civilian residences. This necessary protection has caused several plant species to mature with a dense concentration of old biomass underlying the mature plants. Fire is an important factor that tends to be overlooked as a mechanism to recycle this large amount of biomass into the soils. Due to the sensitive nature of the surrounding area, it is not possible to allow prescribed burning, it is therefore recommended that artificial burn-simulation areas be created following the guidance resulting from current and continuing research conducted by David Bainbridge and students of San Diego State University (SDSU).

Immediate Action: Fire Effects

Get into immediate contact with David Bainbridge for research results and recommendations. Apply all recommendations with care, and study methods for at least several years before applying on a base-wide schedule.

Goal: NPS Pollution Control

Non-point source (NPS) pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage, or hydrologic modification. Technically, the term "non-point

source” is defined to mean any source of water pollution that does not meet the legal definition of “point source” in section 502(14) of the Clean Water Act (CWA). SUBASE will continue and improve their Non-source Pollution Control program as one of the most effective ways to prevent contamination of wildlife and human habitats.

Methods: NPS Pollution Control

It is recommended that the SUBASE investigate a roof runoff management system. This type of system can prevent roof runoff water from flowing across concentrated waste areas, roads, and alleys. It reduces pollution and erosion, improves water quality, prevents flooding, improves drainage, and protects the environment. Such facilities include, but are not limited to, erosion-resistant channels or subsurface drains with rock-filled trenches along building foundations below eaves, roof gutters, down spouts, and other conveyance devices.

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Section V: Appendixes

Appendix A - Naval Submarine Base, San Diego CA (SUBASE) Facility Location Maps

Appendix B - SUBASE Natural Resource Maps and Species Lists (Birds, Insects, Plants, and Reptiles)

Appendix C - Point Loma Bat Survey, 1994

Appendix D - SUBASE Non-native Plant Maps, 1995

Appendix E - White House Memo of 26 April 1994: Landscaping with native plants on federal grounds and federal projects.

Appendix F - Arborist's Report on Tree Growing for Heron Mitigation Habit, 1994

Appendix G - Plant List for Restoration and Revegetation

Appendix H - Erosion Control, Wattling and Cellular Confinement System Specifications

Appendix I - 1980 Nesting Success of Great Blue Herons on Point Loma, San Diego, California

Appendix J - Great Blue Heron and Black-crowned Night Heron Nesting Success, 1991-1996

Appendix K - Heron Management Plan for Naval Submarine Base San Diego, 1995

Appendix L - Investigations into the Status of the California Gnatcatcher on Point Loma, San Diego, California, 1993

Appendix M - Terrestrial Biological Survey and Inventory of Navy Property on Point Loma, San Diego, California, 1993

Appendix N - Insects on Point Loma Navy Property, San Diego, California, 1994

Appendix O - Photo Documentation of SUBASE Natural Resources, 1990-1996

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